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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,963	01/05/2002	Steven Teig	SPLX.P0023	1720

23349 7590 03/13/2003
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EXAMINER
SIEK, VUTHE

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/040,963

Applicant(s)

TEIG ET AL.

Examiner

Vuthe Siek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-57 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 27-31, 40, 41 and 44-53 is/are rejected.
- 7) ☒ Claim(s) 32-39, 42, 43 and 54-57 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This office action is in response to application 10/040,963 and Preliminary Amendment filed on 1/5/2002. Claims 27-57 remain pending in the application.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. As to claims 27 and 50, "and" should be inserted at the end the step a); and as to claim 41, "and" should be inserted at the end of step b).

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

5. Claim 27-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Regarding claims 27-40 and 50-57, the phrase "a threshold value" is unclear to what applicant intends to mean.

7. Other dependent claims which are not specifically cited above are also rejected because of the deficiencies of their respective parent claims.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

9. Claim 27-31, 40, 41 and 44-53 are rejected under 35 U.S.C. 102(a) as being anticipated by Andreev et al. (6,070,108).

10. As to claims 27 and 50, Andreev et al. teach a method for routing a net within a region of an integrated circuit (IC) layout (Figs. 2-3 and 5) comprising a) for the net, identifying a route that uses a first path within the region (Fig. 2, 5; determining wire routing, col. 3, lines 18-32), wherein the first path (N2 as an example in Fig. 5) shares a common region in the IC region with a set of adjacent paths (N2 shares a common region with a set of adjacent path, as shown here N3 and could have many other, since Andreev et al. teach routing based on vertical density and horizontal density; Fig. 5, col. 4-6), wherein said set has at least one path and each path in the set is adjacent to the first path (wires crossing a common region); and b) determining whether embedding the route in the region will cause congestion about the first path and the set of paths to exceed a threshold value (col. 6, lines 1-39; determining wire routing to avoid congestion based on calculated congested region or vertical and horizontal densities, col. 2, col. 5, Figs. 2, 5).

11. As to claims 28-31 and 51-53, Andreev et al. teach wire routing to avoid congestion based on vertical congestion, horizontal congestion or calculated vertical

density and horizontal density (cols. 2, 5-6, Figs. 2, 5). Thus, these teachings suggest selecting the route if embedding the route does not cause the congestion about the paths to exceed the threshold value; discarding the route if embedding the route causes the congestion about the paths to exceed the threshold value; wherein the congestion along the paths includes wireflow along the paths; the congestion along the paths includes blockages of the paths.

12. As to claim 41, remarks set forth in rejecting claims 27 and 50 equally apply here. In addition, Andreev et al. teach partitioning the IC region into a plurality of sub-regions and performing wire routing to avoid congestion based on calculated vertical and horizontal densities (number of tracks available along the first path and the set of paths) (Figs. 2-5).

13. As to claims 44-46, Andreev et al. teach wire routing to avoid congestion based on calculated vertical and horizontal densities including diagonal path and Manhattan path (Figs. 2-5). Thus, such wire routing would suggest a second path that represents routing tracks on a routing layer that also includes at least some of the routing tracks of the first path, wherein the first and second path are diagonal paths that are in the same direction (Fig. 5 shown some diagonal net). Andreev et al. teach wire routing with controlled wire congestion, where Fig. 5 shown, as an example, some diagonal wire and Manhattan path.

14. As to claims 47-49, Andreev et al. teach wire routing with controlled congestion based on calculated vertical and horizontal densities to avoid congestion (Figs. 2-5). Fig. 5 shown an example of wire routing including diagonal path and Manhattan path.

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Since wire routing is complex, such teaching of wire routing including diagonal path and Manhattan path would suggest set paths including a second path and a third path, wherein the first, second path, and third paths are diagonal paths that are in the same direction and that are defined on one routing layer; wherein the set of paths including a second path and a third path, wherein the first and second paths are diagonal paths, and the third path is Manhattan path, wherein the third Manhattan path represents a plurality of tracks in the Manhattan and diagonal directions; wherein the set of paths includes second, third, fourth, and fifth paths, wherein the first through fourth paths are diagonal paths, and the fifth path is Manhattan path, wherein the fifth path represents a plurality of tracks in the Manhattan and diagonal directions.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claim 40 rejected under 35 U.S.C. 103(a) as being unpatentable over Andreev et al. (6,070,108).

17. As to claim 40, a linear programming is well known in the art and has been used in placing and routing of IC design process. Since Andreev et al. teach wire routing to avoid congestion based on calculated congested area including calculated vertical density and horizontal density, thus the calculated vertical and horizontal densities

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would be used as a constraint of a linear programming problem in order to perform wire routing to avoid such congestion.

Allowable Subject Matter

18. Claims 32-39, 42-43 and 54-57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vuthe Siek whose telephone number is (703) 305-4958. The examiner can normally be reached on M-F (6:30-4:00) 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (703) 308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Vuthe Siek
Primary Examiner
February 28, 2003


VUTHE SIEK
PRIMARY EXAMINER